Appl. No.: 10/661,154
Amdt. dated: June 2, 2006
Reply to Office Action of: February 9, 2006

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.-20. (canceled)

21. (currently amended) A [[network switch]] <u>virtualization device</u> coupled to a host computer and at least one disk array system in SAN (Storage Area Network), said disk array system having a controller and a plurality of disk drives and having a logical volume, said logical volume related to a first LUN (Logical Unit Number) and configured by said disk drives, said [[network switch]] <u>virtualization device</u> comprising:

a Fiber Channel switching module; and

a controlling module;

wherein said Fiber Channel switching module comprises:

a first port being coupled to said host computer and receiving an input command sent from said host computer to a virtual volume, said virtual volume being related to said logical volume transparently for said host computer and being related to a second LUN (Logical Unit Number), said input command being based on Fiber Channel Protocol,

a second port being coupled to said disk array system and transferring data of said input command to said disk array system based on said Fiber Channel Protocol, and

at least one first processor coupled to said first port and said second port, cracking said input command and controlling to relay said data of said input command from said first port to said second port selected among a plurality of ports based on said cracking and a map, said map having information of between said virtual volume and said logical volume,

wherein said controlling module comprises a second processor which is coupled to said first processor and controlling a control information in said [[network switch]] virtualization device, and

wherein said Fiber Channel switching module relays said data of said input command to said disk array system without transferring said data of said input command to said controlling module, if said Fiber Channel switching module receives said input command.

22.   (currently amended) A [[network switch]] virtualization device according to claim 21,

wherein said input command having information of a port of said host computer as a source port of said input command, information of said first port as a target port of said input command and information of said virtual volume.

23.   (currently amended) A [[network switch]] virtualization device coupled to a host computer, a first disk array system and a second disk array system in SAN (Storage Area Network), said first disk array system having a first controller and a plurality of first disk drives and having a first logical volume configured by said first disk drives, said second disk array system having a second controller, a plurality of second disk drives and a second logical volume configured by said second disk drives, said [[network switch]] virtualization device comprising:

at least one Fiber Channel switching module comprising

a first port being coupled to said host computer and receiving an input command sent from said host computer to a virtual volume, said virtual volume being related to said first logical volume and said second logical volume transparently for said host computer, said input command being based on Fiber Channel Protocol;

at least one second port being coupled to said first or second disk array system and transferring data of said input command to said first or second disk array systems based on said Fiber Channel Protocol; and

at least one first processor coupled to said first port and said second port, cracking said input command and controlling to relay said data of said input

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command from said first port to said second port selected among a plurality of ports based on said crack and a map, said map having information of between said virtual volume and said first and second logical volumes; and

at least one controlling module comprising a second processor coupled to said first processor, controlling a control information in said [[network switch]] virtualization device;

wherein said Fiber Channel switching module relays said data of said input command to said first or second disk array systems without transferring said data of said input command to said controlling module, if said Fiber Channel switching module receives said input command.

24. (currently amended) A [[network switch]] virtualization device according to claim 23,

wherein said input command having information of a port of said host computer as a source port of said input command, information of said first port as a target port of said input command and information of said virtual volume.

25. (previously presented) A network switch coupled to a host computer and to a first disk array system in SAN (Storage Area Network), said first disk array system having a plurality of first disk drives and at least one first logical volume configured by said first disk drives, comprising:

a Fiber Channel switching device; and

a controlling device;

wherein said Fiber Channel switching device comprises

a first Fiber Channel port receiving a write access request from said host computer to a virtual volume, said virtual volume being related to said first logical volume, the number of said first logical volume being transparently for said host computer,

a second Fiber Channel port transmitting data of said write access request to said first disk array system,

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a first processor being coupled to said first Fiber Channel port and said second Fiber Channel port and controlling to relay said data of said write access request from said first Fiber Channel port to said second Fiber Channel port based on said write access request and a table, said table having a relationship information between said virtual volume and said first logical volume,

wherein said controlling device comprises a second processor controlling a control information concerning said network switch and being coupled to said first processor, and

wherein said Fiber Channel switching device relays said data of said write access request to said first disk array system without transferring said data of said write access request to said controlling device, if said Fiber Channel switching device receives said write access request.

26.   (previously presented) A network switch according to claim 25,

wherein said write access request having information of a port of said host computer as a source port of said write access request, information of said first Fiber Channel port as a target port of said write access request and information of said virtual volume.

27.   (previously presented) A network switch according to claim 25,

wherein said network switch is coupled to a second disk array system, said second disk array system having a plurality of second disk drives,

wherein said second processor controls information, which concerns at least one second logical volume configured by said second disk drives.

28.   (previously presented) A network switch according to claim 25,

wherein said network switch stores an access limit information indicating permission/rejection of said write access request, and

wherein, when said Fiber Channel switching device receives said write access request from said host computer to said first logical volume, said Fiber Channel switching device checks whether said write access request is permitted to access to said first logical volume or not based on said access limit information.

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29.　(previously presented)　A network switch coupled to a host computer, a first disk array system and a second disk array system, said first disk array system having a plurality of first disk drives, said second disk array system having a plurality of second disk drives, said network switch having a virtualization function for making both a first logical volume configured by said first disk drives and a second logical volume configured by said second disk drives be virtualized, said network switch comprising:

a Fiber Channel switching device comprising

a first port receiving an access request sent from said host computer to a virtual volume based on Fiber Channel Protocol, said virtual volume being related to both said first logical volume and said second logical volume transparently for said host computer;

a second port transmitting data of said access request to said first disk array system based on Fiber Channel Protocol; and

a first processor being coupled to said first port and said second port and controlling to relay said data of said access request from said first port to said second port based on said access request and a table, said table having a relationship information among said virtual volume, said first logical volume and said second logical volume;

a controlling device coupled to said Fiber Channel switching device, comprising a second processor controlling a control information concerning said network switch; and

wherein said Fiber Channel switching device relays said data of said access request to said first disk array system without transferring said data of said access request to said controlling device, if said Fiber Channel switching device receives said access request.

30.　(previously presented)　A network switch according to claim 29,

wherein said access request having information of a port of said host computer as a source port of said access request, information of said first port as a target port of said access request and information of said virtual volume.

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31.　(previously presented)　A network switch according to claim 29, wherein said second processor controls said second logical volume.

32.　(previously presented)　A network switch according to claim 29, wherein said network switch stores an access limit information, which indicating permission/rejection of said access request, and

wherein, when said Fiber Channel switching device receives said access request sent from said host computer to said first logical volume, said Fiber Channel switching device checks whether said access request is permitted to access to said first logical volume or is not permitted based on said access limit information.